IN THE CLAIMS

Page 20, line 1, change "Patent Claims" to --What is claimed is:--.

Claims 1-22 (cancelled).

23. (New)   A method for determining the image quality of an optical imaging system that substantially comprises the following subassemblies: illumination system, including light source, sample holder with sample, imaging optics, and at least one spatially resolving detection device, said method comprising the following steps:

adjusting the subassemblies relative to one another in such a way that it is possible to image a sample on the detection device;

recording a plurality of images of the sample from different adjusting or reference planes near the focus plane, wherein the detection device is adjusted relative to the image plane, the sample is adjusted relative to the object plane, or the objective is adjusted relative to the sample;

improving the image quality by means of image processing, particularly to reduce noise, to compensate for local variations in sensitivity of the detection device, and to center the intensity centroids respectively on a predetermined location in the images;

computational linking spatially resolved image information, adjustment values and system variables relating to the optical imaging system, and information concerning the sample with the aim of determining characteristic numbers that are characteristic of the wavefront deformation caused by the imaging system; and

outputting the characteristic numbers and associating them with the imaging system as equivalent for the image quality,

wherein Zernike coefficients are outputted as characteristic numbers, each one being associated with a reference plane.

24. (New)   The method according to claim 23, wherein the characteristic numbers are determined in a first step initially by analytic evaluation and, in a subsequent second step, by further iterative processing of the results from the first step until a given termination

criterion is reached.

25. (New) The method according to claim 24, wherein the determination of Zernike polynomials up to a given order is carried out with the analytic evaluation of the image information.

26. (New) The method according to claim 24, wherein the determination of Zernike coefficients is carried out with the iterative evaluation of the image information based on methods in which every wave surface from the image stack of the sample is considered as a unit, or a pixel-by-pixel evaluation is carried out, and wherein the determined Zernike coefficients correspond to the outputted characteristic numbers.

27. (New) The method according to claim 23, wherein the change of reference plane always takes place in the object space, i.e., by changing the distance of the sample relative to the object plane.

28. (New) The method according to claim 27, wherein the change of reference plane is carried out in predetermined increments.

29. (New) The method according to claim 27, wherein the number of variables in the iterative step of the evaluation is increased, preferably doubled, in relation to the preceding, analytic step.

30. (New) The method according to claim 23, wherein the sample has a pinhole with a diameter d_{PH} = 300 nm, illumination light with the wavelength of 248 nm is used, the pixel size at the sample is 45 nm, the numerical aperture of the imaging system is 0.2, the illumination aperture corresponds to the numerical aperture of the imaging system, the illumination of the sample is carried out with partially coherent light at $\sigma \approx 0.8$, the diameter of the Airy disk in the image is 1.512 µm, the depth of focus is 6.2 µm, the defocusing from image to image is carried out within the depth of focus range at ±1 RE (RE = Rayleigh unit), ±3 RE and ±0.8 RE or ±6.2 µm, ±18.6 µm and ±5 µm, and an odd-number quantity of images is predetermined, preferably a quantity of 7, 11 or 21 images.

31. (New)   The method according to claim 23, wherein a deconvolution of the image information is provided depending upon the size of the pinhole in the sample in order to exclude the influence of the pinhole size on the results.

32. (New)   The method according to claim 23, wherein the influence of the pupil of the imaging system is taken into account in the evaluation of the image information, preferably by means of a pupil image that is obtained using a Bertrand system.

33. (New).   The method according to claim 23, wherein the pupil function is predetermined with respect to apodization.

34. (New)   The method according to claim 23, wherein a plurality of detection devices are arranged at different distances to the image plane and the images are accordingly recorded from the different reference planes at the same time or also successively in time with a corresponding control.

35. (New)   The method according to claim 23, wherein a plurality of samples arranged adjacent to one another or a sample with a plurality of objects arranged adjacent to one another is positioned in the sample holder and information concerning the image quality is accordingly determined simultaneously in relation to the corresponding positions in the visual field of the imaging system, and/or simultaneous measurements are carried out with a plurality of different wavelengths in order to detect dispersive or wavelength-dependent effects.

36. (New)   The method according to claim 23, wherein samples with binary objects, i.e., pure amplitude objects, are provided.

37. (New)   The method according to claim 23, wherein said binary objects are in the form of round or square pinholes.

38. (New)   The method according to claim 23, wherein the image quality is determined in an automatic process beginning with the positioning of a sample until the output of the characteristic numbers.

39. (New)　　The method according to claim 23, wherein an exposure device is provided which ensures an optimal illumination of the sample depending on the change of the reference plane, and the signal-to-noise ratio is accordingly optimized in the images.

40. (New)　The method according to claim 23, wherein a laser beam having a beam waist in the object plane is provided for illuminating the sample in order to achieve a low sigma value and a Gaussian intensity distribution in the pupil.

41. (New)　　The method for determining the influence of different samples on the amplitude distribution and phase front distribution of the illumination light, said method comprising the following steps:

determining the wavefront deformation characterizing the optical imaging system in the form of characteristic numbers according to claim 23 based on a sample with known, defined optical characteristics;

exchanging the known sample for a sample which is to be examined and whose optical characteristics are still unknown;

determining the wavefront deformation again in the form of characteristic numbers according to claim 23 under the influence of the sample to be examined;

determining the influence of the sample to be examined based on the differences of the characteristic numbers for the image quality under the influence of the defined sample and the characteristic numbers for the image quality without the influence of the sample to be examined; and

determining the characteristics of the sample to be examined from the difference of the characteristic numbers.

42. (New)　　The method according to claim 41, wherein the image information obtained with the initially still unknown sample is subjected to post-processing in which the characteristics of the imaging system are separated from the characteristics of the sample that was used to characterize the imaging system, and the specific device characteristics are

accordingly corrected at the same time when imaging the unknown sample.

43. (New)   The method according to claim 42, wherein the influence of specific sample characteristics, particularly the size of an observed object, is also corrected from the image information during the post-processing of the image information at the same time.

44. (New)   The method according to claim 42, wherein in particular the influence of a stepper in microlithography is factored into the characteristics of a sample image again by convolution.

45. (New)   The method according to claim 41, wherein lithography masks, including masks with a phase-shifting effect, are provided as samples.